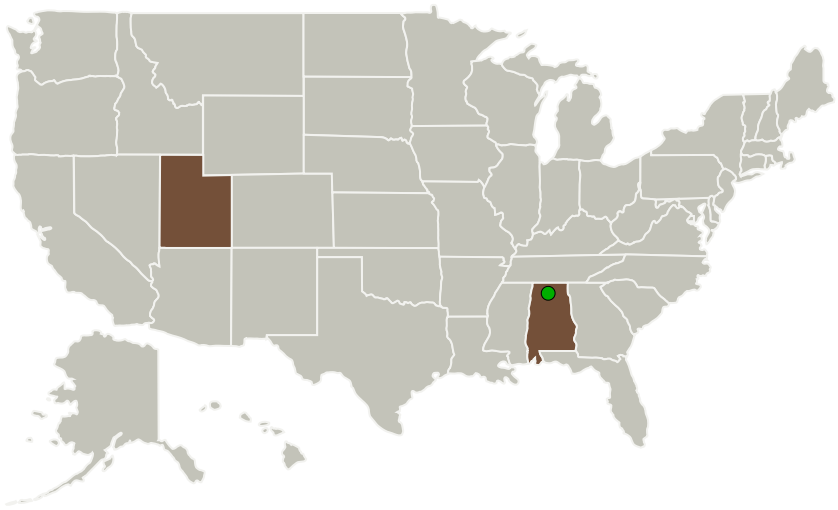
Extremely High Suction Performance Inducers for Space Propulsion, Phase II

Completed Technology Project (2011 - 2014)

Project Introduction

The proposed innovation provides a way to design low flow coefficient inducers that have higher cavitation breakdown margin, larger blade angles, thicker more structurally robust blades, and better off-design flow stability than the current state-of-the-art designs. The technology will increase the structural, stability, and suction margin of inducers designed in the currently acceptable flow coefficient range of about 0.06 to 0.1. In addition, it will allow for stable and structurally robust designs at much lower flow coefficients than previously thought possible (down to at least 0.02) for the capability to operate in near zero net positive suction pressure inlet environments. The innovation is based upon a synergistic coupling of Concepts NREC's patented cavitation control device with a new blade design approach that takes full advantage of the CCD's characteristics for optimal suction performance. The technology significantly enhances the capability of rocket engine systems through increased thrust-to-weight, specific impulse, simplicity, operational safety, and turbopump life. It will also reduce turbopump and propellant tank weight and system costs by eliminating boost pump systems and allowing for lighter lower pressure tanks.

Primary U.S. Work Locations and Key Partners



Extremely High Suction Performance Inducers for Space Propulsion, Phase II

Table of Contents

Extremely High Suction Performance Inducers for Space Propulsion, Phase II

Completed Technology Project (2011 - 2014)

Organizations Performing Work	Role	Type	Location
Concepts ETI, Inc.	Lead Organization	Industry	White River Junction, Vermont
Brigham Young University-Provo	Supporting Organization	Academia	Provo, Utah
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Utah

Project Transitions

July 2011: Project Start

September 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138856)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Concepts ETI, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Kerry N Oliphant

Co-Investigator:

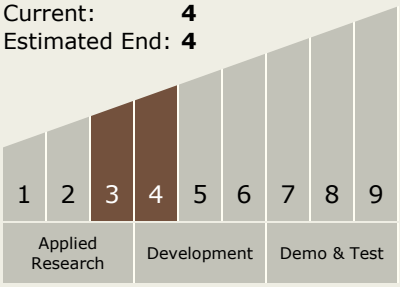
Kerry Oliphant

Extremely High Suction Performance Inducers for Space Propulsion, Phase II

Completed Technology Project (2011 - 2014)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System